Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A method for determining an image formed by means including a projection system having an illumination source of illumination energy and a projection lens for projecting the illumination energy, wherein a mask is disposed between the illumination source and the projection lens, the method comprising the steps of:

providing a source intensity distribution;

providing a projection impulse response, said projection impulse response comprising an impulse response of the projection lens to the illumination energy; and

forming a generalized bilinear kernel comprising an autocorrelation of the source intensity distribution with the projection impulse response, wherein said generalized bilinear kernel comprises at least one non-scalar effect due to the vector character of the electric field of the illumination energy.

2. (original) The method of claim 1 further comprising:
providing a mask transmission function; and
providing an expression for the image, said expression comprised of said generalized bilinear kernel and said mask transmission function, wherein said generalized bilinear kernel is independent of said mask transmission function.

3. (original) The method of claim 2 wherein the image is an aerial image.

4. (original) The method of claim 2 wherein the image is a resist image.

5. (original) The method of claim 1 wherein said autocorrelation further includes a resist blur function.

6. (original) The method of claim 5 further comprising:
providing a mask transmission function; and
providing an expression for a resist image, said expression comprised of said generalized bilinear kernel and said mask transmission function, wherein said generalized bilinear kernel is independent of said mask transmission function.

7. (original) The method of claim 1 further comprising:
providing a resist stack structure;
determining an exposure response at a plane within said resist stack structure; and
wherein said step of providing a projection impulse response further comprises said exposure response at said plane of said resist stack structure.

8. (original) The method of claim 7, further comprising determining an exposure response at a plurality of planes within said resist stack structure, and said step of forming a generalized bilinear kernel comprises forming an average generalized bilinear kernel comprised of said exposure responses for each of said plurality of planes.

9. (original) The method of claim 7 wherein said exposure response further comprises a resist blur function.

10. (original) The method of claim 7, further comprising determining an exposure response at a plurality of defocus positions, and said step of forming a generalized bilinear kernel comprises

forming an average generalized bilinear kernel comprised of said exposure responses for each of said plurality of defocus positions.

11. (original) The method of claim 1 wherein said projection impulse response comprises a lens defocus different from zero.

12. (original) The method of claim 1 further comprising providing an illumination polarization distribution, and wherein said projection impulse response is a vector impulse response.

13. (currently amended) A method for determining an image formed by a lithographic process including a projection system having an illumination source of illumination energy and a projection lens for projecting the illumination energy, wherein a mask is disposed between the illumination source and the projection lens, the method comprising the steps of:

providing a scalar source intensity distribution;

providing an projection impulse response;

providing an exposure response of the lithographic process including a resist blur function;

forming a generalized bilinear kernel comprising an autocorrelation of the scalar source intensity distribution with a combination of the projection impulse response and the exposure response, wherein said generalized bilinear kernel comprises at least one non-scalar effect due to the vector character of the electric field of the illumination energy.

14. (original) The method of claim 1, further comprising forming a decomposition of said generalized bilinear kernel.

15. (original) The method of claim 14, wherein said forming a decomposition of said generalized

bilinear kernel further comprises the steps of:

providing a first grid of an integration region of interest;

tabulating values of said generalized bilinear kernel at grid points of said region of interest;

remapping the tabulated values of said generalized bilinear kernel to a reduced basis;

determining dominant eigenfunctions of said generalized bilinear kernel in the reduced basis;

converting the dominant eigenfunctions of the said generalized bilinear kernel to the first grid;

convolving the converted dominant eigenfunctions with a set of polygon sectors to form precomputed sector convolutions for each of said converted dominant eigenfunctions.

16. (original) The method of claim 15, further comprising, after providing the first grid of an integration region of interest, folding the region of interest according to the symmetry of the system, and wherein said tabulating values of said generalized bilinear kernel is performed at grid points in the folded region of interest.

17. (original) The method of claim 16, further comprising, after the step of converting the eigenfunctions to the first grid, iteratively refining the converted dominant eigenfunctions against the tabulated values of the generalized bilinear kernel.

18. (original) The method of claim 15, further comprising:

providing a mask transmission function;

decomposing said mask transmission function into a subset of said set of polygon sectors;

forming a weighted pre-image comprising a coherent sum of said precomputed sector

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convolutions for each of said converted dominant eigenfunctions;

forming the image comprising the incoherent sum of the weighted pre-images of all of said converted dominant eigenfunctions.

19. (currently amended) An article of manufacture comprising a computer-usable medium having computer readable program code means embodied therein for determining an image formed by means including a projection system having an illumination source of illumination energy and a projection lens for projecting the illumination energy, wherein a mask is disposed between the illumination source and the projection lens, the computer readable program code means in said article of manufacture comprising:

computer readable program code means for providing a source intensity distribution;

computer readable program code means for providing a projection impulse response; and

computer readable program code means for forming a generalized bilinear kernel comprising an autocorrelation of the source intensity distribution with the projection impulse response, wherein said generalized bilinear kernel comprises at least one non-scalar effect due to the vector character of the electric field of the illumination energy.

20. (currently amended) ~~An~~The article of manufacture of claim 19 ~~comprising a computer usable medium having computer readable program code means embodied therein for determining an image formed by means including a projection system having an illumination source and a projection lens, wherein a mask is disposed between the illumination source and the projection lens,~~wherein the computer readable program code means in said article of manufacture further comprises~~comprising~~:

computer readable program code means for providing a first grid of an integration region of interest;

computer readable program code means for tabulating values of said generalized bilinear kernel at grid points of said region of interest;

computer readable program code means for remapping the tabulated values of said generalized bilinear kernel to a reduced basis;

computer readable program code means for determining dominant eigenfunctions of said generalized bilinear kernel in the reduced basis;

computer readable program code means for converting the dominant eigenfunctions of the said generalized bilinear kernel to the first grid;

computer readable program code means for convolving the dominant eigenfunctions with a set of possible polygon sectors to form precomputed sector convolutions for each of said dominant eigenfunctions.

21. (currently amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for determining an image formed by means including a projection system having an illumination source of illumination energy and a projection lens for projecting the illumination energy, wherein a mask is disposed between the illumination source and the projection lens, said method steps comprising:

providing a source intensity distribution;

providing a projection impulse response; and

forming a generalized bilinear kernel comprising an autocorrelation of the source intensity distribution with the projection impulse response, wherein said generalized bilinear kernel comprises at least one non-scalar effect due to the vector character of the electric field of the illumination energy.

22. (currently amended) The~~A~~ program storage device of claim 21 ~~readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for determining an image formed by means including a projection system having an illumination source and a projection lens, wherein a mask is disposed between the illumination source and the projection lens,~~wherein said method steps further comprise ~~comprising~~:

providing a first grid of an integration region of interest;

tabulating values of said generalized bilinear kernel at grid points of said region of interest;

remapping the tabulated values of said generalized bilinear kernel to a reduced basis;

determining dominant eigenfunctions of said generalized bilinear kernel in the reduced basis;

converting the dominant eigenfunctions of the said generalized bilinear kernel to the first grid;

convolving the dominant eigenfunctions with a set of possible polygon sectors to form precomputed sector convolutions for each of said dominant eigenfunctions.

23. (new) The method of claim 1 wherein said at least one non-scalar effect is selected from the group consisting of lens birefringence, tailored source polarizations, blurring imposed by optics, and blurring imposed by multiple reflections within a film stack.

24. (new) A method for determining an image formed by means including a projection system having an illumination source of illumination energy and a projection lens for projecting the illumination energy, wherein a mask is disposed between the illumination source and the projection lens, the method comprising the steps of:

providing a source intensity distribution;

providing a projection impulse response, said projection impulse response comprising an impulse response of the projection lens to the illumination energy; and

forming a generalized bilinear kernel comprising an autocorrelation of the source intensity distribution with the projection impulse response, wherein said generalized bilinear kernel comprises mask blur.